Claims discussion vs 20040037708

Introduction:

In this document, the claims given in Patent Application 10/732,857 entitled the LIGHT TRIGGERED LIGHT SWITCH will be shone to be unique and different from the claims given in United States Patent Application number 20040037708 entitled the WORKING-FLUID MOVING DEVICE. In brief, THE LIGHT TRIGGERED LIGHT SWITCH is an on/off switch, and uses the power of light in or near the channel to actuate the switch, and the WORKING-FLUID MOVING DEVICE is a switch using an applied voltage to push a fluid around that does not use the power of the light in or near the channel to actuate the switch. The following Table 1 allows a comparison of the two inventions.

Compare	20040037708	10/732,857
Not same	No transparent piezoelectric mentioned	Transparent piezoelectric is claimed
Not same	No light or optical channel	Light channels in Claims and Drawings
Not same	An electrical voltage is applied to actuate the switch	A light channel that closes in time as the piezoelectric material swells under the action of the electric field of light
Not same	Shiny fluid is not in the way	Channel is large enough for light to pass
Not same	Shiny fluid is in the way	Channel is too small so light is stopped
Not same	Applied voltage	Power of the electrical field of light
Not same	Drawn as an electrical switch	Never depicted as an electrical switch
Not same	Working-fluid is pushed by voltage applied to a piezoelectric/electrostrictive film	Piezoelectric material responds to light power to change the dimensions of the channel
Notes	Applied voltage switching speed slower than 10^{-9} sec.	Light faster than 10^{-11} seconds
Notes	Present technology, no advantage	More than 100 times faster, much better

Table 1.

The discussion below works with the words of each patent clearly exposing the differences between these two inventions so that the superior technology of the LIGHT TRIGGERED LIGHT SWITCH may receive the patent protection that it disserves.

Claims discussion:

LIGHT TRIGGERED LIGHT SWITCH Claim 1:

1. The first words of Claim 1 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

"An on and off switch for light in a channel"

In the WORKING-FLUID MOVING DEVICE patent application, it is said that the device can be configured to serve as an on-off switch in paragraph 0121. Nowhere in the claims of patent application 20040037708 of Marahiro Murasato et al. is on-off switch or on and off switch mentioned. Nowhere in the WORKING-FLUID MOVING DEVICE, patent application is a light channel mentioned. No optical wave-guide or optical channel is shown in any of the drawings associated with patent application 20040037708.

2. The second words in Claim 1 in the LIGHT TRIGGERED LIGHT SWITCH are as follows:

"a channel comprising a transparent piezoelectric light channel"

Nowhere in patent application 20040037708 is a transparent piezoelectric light channel mentioned. A "piezoelectric/electrostrictive" film is mentioned many times, but it

puts pressure on the working fluid. It does not have to be transparent since they are not part of the light channel or wave-guide as is claimed in Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH. The term "transparent piezoelectric" is never used in the WORKING-FLUID MOVING DEVICE patent application.

In paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be what actuates the piezoelectric/electrostrictive film. Voltages can be switched on and off by a hand actuated switch, an electromagnetic solenoid, a relay, or a transistor circuit. The fastest of these would be the transistor circuit, which can switch at 10^{-9} seconds in the best conditions. This is one billionth of a second. Many devices use transistors to switch and they only achieve 10^{-7} seconds because of the mechanical responses to the signal that the transistor provides. This is a ten millionth of a second. The LIGHT TRIGGERED LIGHT SWITCH is much faster being able to switch in a one hundred billionth of a second. The LIGHT TRIGGERED LIGHT SWITCH is different than and superior to the WORKING-FLUID MOVING DEVICE.

3. The next words in Claim 1 of the disclosure of the LIGHT TRIGGERED LIGHT SWITCH are as follows:

"light channel that is made
A larger in cross section
B smaller in cross section"

Light channels or wave-guides are not mentioned in patent application 20040037708, which teaches WORKING-FLUID MOVING DEVICE.

Element 50, 60, and 70 in Figures 7A and 7B, 8A and 8B, and 9A and 9B respectively represent the WORKING-FLUID MOVING DEVICE as an electrical switch not an optical switch as figures 10A and 10B, 11A and 11B, 12A and 12B, and Figure 13 do as well. No drawing in patent application 20040037708 depicts any optical channel or optical wave-guide. This trench is not a light channel or wave-guide as it is in the LIGHT TRIGGERED LIGHT SWITCH.

4. The next words in Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH are as follows:

"by the action of the electric field of light passing through the channel"

Nowhere in the claims of patent application 20040037708 is the electric field of light or its voltage or power mentioned.

In the disclosure of the LIGHT TRIGGERED LIGHT SWITCH the DETAILED DESCRIPTION OF THE INVENTION, the second sentence teaches that the electric field of the light acts upon the piezoelectric material to make the switch actuate. From that second sentence on through mathematical calculations with the Poynting vector equation, that is used to explain the way the electric field of the light in the channel actuates the piezoelectric material causing it to expand or contract, and on into the description of each drawing, the light power is triggering the switching.

By actuating a switch with the electric field of the light, switching speeds of less than one hundred billionth of a second 10^{-11} can be achieved. By actuating a switch by the "voltage is applied" of the WORKING-FLUID MOVING DEVICE, switching speeds of a billionth of a second 10^{-9} are the fastest that can be achieved.

5. The next words in Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH are as follows in the A and B portions:

"A by opening to the passage of the light signals
B by closing to the passage of the light signals"

The claims for patent application 20040037708 do not mention light signals. In paragraph 0002, patent application 20040037708 mentions that WOKING-FLUID MOVING DEVICE CAN be used to switch optical paths, but none of the claims mention an optical path. None of the figures for the WORKING-FLUID MOVING DEVICE illustrate an optical path. This switch changes electrical signals; it does not close to the passage of light signals, as does the LIGHT TRIGGERED LIGHT SWITCH. In paragraph 0021 and 00127 of patent application 20040037708 a description of how the WORKING-FLUID MOVING DEVICE could be use as an optical display element, but not an optical switch. In paragraph 0021 and 0127 optical display uses of the WORKING-FLUID MOVING DEVICE ARE mentioned, but with the fluid described as mercury or gallium alloy as claim 7 teaches clearly transmitting or processing optical signals is not the intent of patent application 20040037708 as it is for the LIGHT TRIGGERED LIGHT SWITCH. One can figure a way the mercury or gallium alloy of the WORKING-FLUID MOVING DEVICE WILL reflect a light signal, and be an optical switch. The patent application does not describe this, but this is very different in action from the LIGHT

TRIGGERED LIGHT SWITCH. In paragraph 0195 of patent application 20040037708 a description of how the WORKING-FLUID MOVING DEVICE COULD be used as an optical position detector but no description of the optical switch use is found. The patent applications describe very different devices.

6. The last words in Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH are as follows in the A and B portions:

"A for the switch to be in the on condition
B for the switch to be in the off condition."

The switch being described is an on and off switch. The WORKING-FLUID MOVING DEVICE IS an on and off switch, but it is for electrical signals. There is one mention of the WORKING-FLUID MOVING DEVICE being used for a switch for optical paths in paragraph 0002, but no claim or figure mentions optical paths. Element 50, 60, and 70 in Figures 7D, 8C, and 9C respectively represent the WORKING-FLUID MOVING DEVICE AS an electrical switch as figures 11B, 12B, and Figure 13 do as well.

LIGHT TRIGGERED LIGHT SWITCH Claim 2:

1. The first words of Claim 2 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

"An on and off switch for light in a channel comprising a channel next to a piece of piezoelectric material"

This part of Claim 2 clearly states "An on and off switch for light" The WORKING-FLUID MOVING DEVICE is a switch for electrical

circuits. The WORKING-FLUID MOVING DEVICE can be used to reflect light or not reflect light if the wall of the channel is made transparent to let the light hit the mercury or gallium alloy, but the patent application 20040037708 never mentions an optical channel or optical wave-guide. The switch described in Claim 2 has no transparent piezoelectric member that carries the light. The piezoelectric member is next to a transparent material that is carrying the light signal, and the light that causes the piezoelectric member to change shapes and closes the channel down. The piezoelectric material used may be transparent, but there are less expensive piezoelectric materials that are not transparent that can be used in a switch that is made as this claim describes. The channel that closed down in patent application 20040037708 is a channel containing mercury or gallium alloy. When the channel closes down for the WORKING-FLUID MOVING DEVICE light signals are not prevented because the channel is small, but the mercury or gallium alloy is forced to separate in the middle by applying a voltage to piezoelectric/electrostrictive. In paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be what actuates the piezoelectric/electrostrictive film. Voltages can be switched on and off by a hand actuated switch, an electromagnetic solenoid, a relay, or a transistor circuit. The fastest of these would be the transistor circuit, which can switch at 10^{-9} seconds in the best conditions. This is one billionth of a second. Many devices use transistors to switch and they only achieve 10^{-7} seconds because of the mechanical responses to the signal that the transistor provides. This is a ten millionth of a

second. The LIGHT TRIGGERED LIGHT SWITCH is much faster being able to switch in a one hundred billionth of a second. The LIGHT TRIGGERED LIGHT SWITCH is different from the WORKING-FLUID MOVING DEVICE and superior to it.

2. The second words in Claim 2 in the LIGHT TRIGGERED LIGHT SWITCH are as follows:

"where the channel carrying the light is made

A. larger in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material

B. smaller in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material"

In the switch described here, as the one described in Claim 1, the light signal is stopped from passing through the switch because the electric field of light in the wave-guide or channel is causing the piezoelectric material of the switch to move. The movement of the piezoelectric material opens up or closes down the channel to the light. This opening or closing, causes the on or off of the switch, because light cannot go through a channel that is as small as a quarter of its wavelength. The switch described in patent application 20040037708 squeezes mercury or gallium alloy (Claim 7) to separate the electrically conductive metal and open the circuit through the switch. One can envision a way this metal could be used to accomplish the reflection of the light for use as an optical switch, but no description of this is given.

These are two very different means of switching. The LIGHT TRIGGERED LIGHT SWITCH will switch faster than a hundred billionth of a second. The WORKING-FLUID MOVING DEVICE will not be able to achieve switching in less than a billionth of a

second. In this switch, the wave-guide that is made smaller as the piezoelectric material gets bigger must be made out of a flexable material so that it can respond to the pressure of the piezoelectric material.

3. The next words in Claim 2 of the disclosure of the Light Triggered Light Switch are as follows:

"A. that by contracting opens the light carrying channel to light signals"
B. that by expanding into the light carrying channel closes the light channel to light signals"

Murasato et. al., U.S.P. application No. 20040037708, which teaches WORKING-FLUID MOVING DEVICE, has a channel that is made smaller by action of a piezoelectric/electrostrictive, but the channel is not an optical channel. It has two fluids in it. One of these fluids is mercury or gallium alloy. No light can pass through this channel. Application 11/732,857 has piezoelectric material that in a very short time change their dimensions to close off a light channel. The WORKING-FLUID MOVING DEVICE is actuated by a voltage being applied while the LIGHT TRIGGERED LIGHT SWITCH changes diameter with time when the light of sufficient power passes through it. These are two very different means of operation, and Application 11/732,857 is superior because it can switch more than 100 times faster.

4. The next words in Claim 2 of the disclosure of the LIGHT TRIGGERED LIGHT SWITCH are as follows:

"A. causing the on condition

B. causing the off condition"

The LIGHT TRIGGERED LIGHT SWITCH claims to be an on/off switch for light signals. Nowhere in the claims of patent application number 20040037708 is a description of the WORKING-FLUID MOVING DEVICE functioning as a light signal switch. The LIGHT TRIGGERED LIGHT SWITCH stops light from continuing down a wave-guide or channel. The WORKING-FLUID MOVING DEVICE breaks an electrical circuit from one electrode or terminal to another. From discussions in paragraph 0021 and 00127 of optical display element uses of the one can guess that the mercury or gallium alloy could reflect optical signals or not reflect optical signals in different switch states, but no description of the switch in use a light signal switch in light channels or optical wave-guides is given.

LIGHT TRIGGERED LIGHT SWITCH Claim 3:

1. The first words of Claim 3 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

"An on and off switch for light signals in a channel comprising a compressible fluid portion of the channel with a side that is composed of a piezoelectric material"

The arguments for this claim are the same as for Claim 2. The difference is that the material of the wave-guide that the piezoelectric part moves into a compressible fluid instead of compressing a solid. Figure 3 A and B show the compressible fluid before and during response to the electric field of the light in the channel. No mercury or gallium is divided or moved in the LIGHT

TRIGGERED LIGHT SWITCH where in the WORKING-FLUID MOVING DEVICE as seen in Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B the first working fluid is separated so that it does not provide an electrical path form one electrode or terminal to the other. The speed of the LIGHT TRIGGERED LIGHT SWITCH comes from the response of the piezoelectric crystal to the electric field of the light. The reason the WORKING-FLUID MOVING DEVICE is so much slower is that signals switched in transistors or slower mechanisms must mechanically or thermally push the first working fluid (mercury or gallium alloy as claim 7 makes clear) to effect the switching. The LIGHT TRIGGERED LIGHT SWITCH is more than 100 times faster.

2. The second words of Claim 3 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

"piezoelectric material that responds to the electric field in the light in the channel to
A. Contract the piezoelectric wall of the channel to open up
B. Expanding into the light channel to close"

As is illustrated in Figures 3A and 3B the LIGHT TRIGGERED LIGHT SWITCH associated with Application 10/732,857 uses the response of piezoelectric material to the electric field of light to open up or close down the dimensions of the light channel so that light can pass through it or is too small for the light to pass through it. As is illustrated by Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B of the WORKING-FLUID MOVING DEVICE which is has been given patent number 20040037708 the switching of the electrical path is

effected by the manipulation of the first working fluid away from the electrodes or terminals of the switch. These are two different mechanisms. The LIGHT TRIGGERED LIGHT SWITCH shuts off light in an optical channel while the WORKING-FLUID MOVING DEVICE breaks an electrical circuit formed by the first working fluid, which is mercury or gallium, alloy. The speed with which invention described in Application 10/732,857 can switch the signal off is much faster than the invention described in patent number 20040037708 can, because the electric field of light is switching the LIGHT TRIGGERED LIGHT SWITCH. The WORKING-FLUID MOVING DEVICE depends upon an "applied voltage" which is turned on by a hand switch, solenoid, relay, or transistor to send electricity to push the first working fluid (mercury) around. The transistor switch would be the fastest at 10^{-9} seconds (that is a billionth of a second). The signal then must cause piezoelectric material to put pressure on the mercury or gallium alloy (claim 7). These operations make the switch slower than the transistor. Actually the speed that this switch will only be able to switch at 10^{-7} seconds (that is a ten millionth of a second). The LIGHT TRIGGERED LIGHT SWITCH will switch faster than 10^{-11} seconds (that is a hundred billionth of a second). If the proper wavelength is used the LIGHT TRIGGERED LIGHT SWITCH could switch at 10^{-13} seconds (that is a ten trillionths of a second). It is seen that the LIGHT TRIGGERED LIGHT SWITCH is not the same as the WORKING-FLUID MOVING DEVICE, and the LIGHT TRIGGERED LIGHT SWITCH is superior and should be granted patent protection.

3. The last words of Claim 3 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

A. " the channel to larger dimensions so that the light signal easily passes through the channel causing the on condition.
B. the light channel to smaller dimensions so that the light signal may not pass through the channel causing the off condition."

These words show that the way that the LIGHT TRIGGERED LIGHT SWITCH turns off the light is by the dimensions of the channel is wider to let the light through or the dimensions of the channel is smaller to stop the light from passing through the channel. It is pointed out in the DETAILED DESCRIPTION OF THE INVENTION section of Application 10/732,857 that when a light channel or waveguide is shrunken to a given dimension then light of 8056 angstroms will no longer pass through it. Lights of shorter wavelength can still pass through it. The 8056 angstrom or longer wavelength light would be the one that is the signal that is switched on or off. The light that is doing the switching could be shorter wavelengths that can still pass and their electric field is effecting the change in dimensions by acting on the piezoelectric material. This specific example is given to teach that the light of specific wavelength and power will switch on or off a signal in an other specific wavelength. Light is fast and is capable of turning on or off a light signal much faster than the first and second working fluid machinations described in Murasato et. al., U.S.P. Application No.20040037708 Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B.

LIGHT TRIGGERED LIGHT SWITCH Claim 4:

The words of the Claim 4 in LIGHT TRIGGERED LIGHT SWITCH read as follows:

"A light switch as claimed in claims one, two, or three that is actuated by the power of the switching light, which is the same wavelength as the light signal in the channel that is switched on and off."

This claim teaches that light that is sufficient power to trigger the switching the LIGHT TRIGGERED LIGHT SWITCH may be of the same wavelength as the light signal that is in the channel that the switch is used to turn on or shut off. The electric field of light is never mentioned in Murasato et al., U.S.P. Application No 20040037708. The power of light is never mentioned in Murasato et al., U.S.P. No 20040037708. In the LIGHT TRIGGERED LIGHT SWITCH of Application 10/732,857 in the BEST MODE FOR CARRING OUT THE INVENTION, section the Poynting vector equation is used to calculate the exact response to be expected from a piezoelectric element from a specific power of light in watts. Clearly, these are different inventions.

LIGHT TRIGGERED LIGHT SWITCH Claim 5:

The words of Claim 5 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch as claimed in claims one, two, or three that is actuated by the power of the switching light, which is a shorter wavelength than the light signal in the channel that is switched on and off."

This claim teaches that light that is sufficient power to trigger the switching the LIGHT TRIGGERED LIGHT SWITCH may be a

shorter wavelength than the light signal that is in the channel that the switch is used to turn on or shut off. The electric field of light is never mentioned in Murasato et al., U.S.P. Application No 20040037708. The power of light is never mentioned in Murasato et al., U.S.P. Application No 20040037708. In the LIGHT TRIGGERED LIGHT SWITCH of Application 10/732,857 in the BEST MODE FOR CARRING OUT THE INVENTION, section the Poynting vector equation is used to calculate the exact response to be expected from a piezoelectric element from a specific power of light in watts. The voltage of the light at a power is calculated along with the change in the piezoelectric element. Clearly, these are different inventions.

LIGHT TRIGGERED LIGHT SWITCH Claim 6:

1. The first words of Claim 6 of the LIGHT TRIGGERED LIGHT SWITCH application read as follows:

"A light switch as claimed in claims one, two, or three that is actuated by the power of the switching light,"

This claim teaches that light that is sufficient power to trigger the switching the LIGHT TRIGGERED LIGHT SWITCH may be a shorter wavelength than the light signal that is in the channel that the switch is used to turn on or shut off. The electric field of light is never mentioned in Murasato et al., U.S.P. Application No 20040037708. The power of light is never mentioned in Murasato et al., U.S.P. Application No 20040037708. In the LIGHT TRIGGERED LIGHT SWITCH of Application 10/732,857 in the BEST MODE FOR CARRING OUT THE INVENTION, section the Poynting vector equation is used to calculate the exact response to be

expected from a piezoelectric element from a specific power of light in watts. Clearly, these are different inventions.

2. The next of Claim 6 of the LIGHT TRIGGERED LIGHT SWITCH application reads as follows:

"which is a longer wavelength than the light signal in the channel that is switched on and off"

This claim teaches that the light signal that is switched on or off can be switched on or off by a light signal that is longer in wavelength. Claim 4 and 5 teach that the light signal that is switched on or off can be switched on or off by a light signal that is the same or a shorter wavelength than the light signal that is being switched on or off. This switching by light is the key advantage of this the Application 10/732,857, which teaches LIGHT TRIGGERED LIGHT SWITCH. Light is so much quicker than control signals. Patent number 20040037708 is turned on or off the application of a voltage as is seen in paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be what actuates the piezoelectric/electrostrictive film. Voltages can be switched on and off by a hand actuated switch, an electromagnetic solenoid, a relay, or a transistor circuit. The fastest of these would be the transistor circuit, which can switch at 10^{-9} seconds in the best conditions. This is one billionth of a second. Many devices use transistors to switch and they only achieve 10^{-7} seconds because of the mechanical responses to the signal that the transistor provides.

This is a ten millionth of a second. The LIGHT TRIGGERED LIGHT SWITCH is much faster being able to switch in a one hundred billionth of a second. The LIGHT TRIGGERED LIGHT SWITCH is different than and superior to the WORKING-FLUID MOVING DEVICE. These two inventions are very different in their action.

LIGHT TRIGGERED LIGHT SWITCH Claim 7:

The words of Claim 7 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claim one where the piezoelectric material is transparent to the light passing through it."

There are many materials mentioned in Application 10/732,857 that are piezoelectric these are quartz (SiO_2), lithium niobate ($LiNbO_3$), lead zirconate ($PbZrO_3$), lead titanate ($PbTiO_3$), and lead zirconate titanate. Lead zirconate titanate is also called PZT. Of these lithium niobate and quartz are transparent. In Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH the light channel is composed of transparent piezoelectric material and changes dimensions as the switching light signal acts upon it as Figures 1A and 1B illustrate. Nowhere in Patent, application 20040037708 is a transparent piezoelectric element mentioned. Nowhere in Patent application 20040037708 does a light channel change physical dimensions. Patent application 20040037708 does not show any light channels.

In fact in the WORKING-FLUID MOVING DEVICE Claim 7.

The words of Claim 7 in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to claim 6, wherein the liquid metal is mercury or a gallium alloy. "

This claim makes clear that the action of the WORKING-FLUID MOVING DEVICE is manipulating a conductive liquid metal to switch electrical signals delivered to the electrode or terminals. This is not how the LIGHT TRIGGERED LIGHT SWITCH works. In Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"light channel that is made
A larger in cross section by opening to the passage of the light signals
B smaller in cross section by closing to the passage of the light signals"

In Claim 2 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"where the channel carrying the light is made
A.larger in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material
B.smaller in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material"

In Claim 3 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"A. Contract the piezoelectric wall of the channel to open up
B. Expanding into the light channel to close"

The two switches function differently. Patent application 20040037708 teaches the moving of mercury or gallium alloy, while Application 10/732,857 teaches the optical wave-guide is physically made large enough or pinched down to be too small to turn on or shut off the light.

LIGHT TRIGGERED LIGHT SWITCH Claim 8:

The words of Claim 8 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claim three where the compressible fluid is a gas"

Figure 3A and 3B of the LIGHT TRIGGERED LIGHT SWITCH application show the area that the piezoelectric part of the switch responds to the electric field of the light to open or close. Claim 8 teaches that the area that the piezoelectric part can be expanding into can be filled with a gas. There is no mention of a liquid mental being moved around so that light will bounce off of it as is illustrated in Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B of the WORKING-FLUID MOVING DEVICE show clearly that the signal being switched is an electrical one not a optical one. The reason there is no mention of a liquid mental in the application of the LIGHT TRIGGERED LIGHT SWITCH is that the function of the two switches is completely differently.

LIGHT TRIGGERED LIGHT SWITCH Claim 9:

The words of Claim 9 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claim three where the compressible fluid is a mixture of gases."

Figure 3A and 3B of the LIGHT TRIGGERED LIGHT SWITCH show the area that the piezoelectric part of the switch responds to the electric field of the light to open or close. Claim 8 teaches that the area that the piezoelectric part can be expanding into can be filled with a gas. There is no mention of mercury or gallium alloy being pushed around so that light will bounce off of it. The reason there is no mention of mercury or gallium alloy in the LIGHT TRIGGERED LIGHT SWITCH application is that the functions of the two switches are completely different.

LIGHT TRIGGERED LIGHT SWITCH Claim 10:

The words of Claim 10 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claim three where the compressible fluid is a liquid."

Figure 3A and 3B of the LIGHT TRIGGERED LIGHT SWITCH application show the area that the piezoelectric part of the switch responds to the electric field of the light to open or close. Claim 8 teaches that the area that the piezoelectric part can be expanding into can be filled with a gas. There is no mention of a mercury or gallium alloy (Claim 7) being pushed around so that light will

bounce off of it. The reason there is no mention of mercury in the LIGHT TRIGGERED LIGHT SWITCH application is that the functions of the two switches are completely different.

LIGHT TRIGGERED LIGHT SWITCH Claim 11:

The words of the Claim 11 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claim three where the compressible fluid is a mixture of liquids."

Figure 3A and 3B of the LIGHT TRIGGERED LIGHT SWITCH application show the area that the piezoelectric part of the switch responds to the electric field of the light to open or close. Claim 8 teaches that the area that the piezoelectric part can be expanding into can be filled with a gas. There is no mention of liquid metal working fluids being pushed around so that light will bounce off of it. Murasato et. al., U.S.P. Application No. 20040037708 use symbols for their switch that show it is a switch for electrical circuits Figures 7D, 8C, 9C, 11B, 12B, and 13 represent the WORKING-FLUID MOVING DEVICE as an electrical switch.
The reason there is no mention of an electrical switching in the LIGHT TRIGGERED LIGHT SWITCH application is that the functions of the two switches are completely different.

LIGHT TRIGGERED LIGHT SWITCH Claim 12:

The words of Claim 12 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claims two and three were more than one wall of the switch is piezoelectric material that responds to the electric field of the light in the channel turning the switch on and off."

This claim teaches that the LIGHT TRIGGERED LIGHT SWITCH is actuated by the power of light passing through the light channel, the channel is not full of liquid metal, mercury or gallium alloy which would not allow light signals to pass. The WORKING-FLUID MOVING DEVICE, patent 20040037708, never mentions the electric field of the light or wave-guides. However, the mercury providing a path for electrical signals for wires is the key to how the WORKING-FLUID MOVING DEVICE works.

LIGHT TRIGGERED LIGHT SWITCH Claim 13:

The words of Claim 13 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claims one, two, and three were the piezoelectric material responds to power level of the light in the channel turning the switch on and off."

This claim teaches that the LIGHT TRIGGERED LIGHT SWITCH is actuated by the power level of light passing through the light channel; the index of refraction is not involved, as the piezoelectric material responds. The WORKING-FLUID MOVING DEVICE, patent 20040037708, never mentions the electric field of the light in or optical channels. The channel in the WORKING-FLUID MOVING DEVICE is full of electrically conductive metal that is the key to

how the WORKING-FLUID MOVING DEVICE works. The function of these two switches is completely different.

LIGHT TRIGGERED LIGHT SWITCH Claim 14:

The words of Claim 14 of the LIGHT TRIGGERED LIGHT SWITCH APPLICATION READ as follows:

"A light switch for light signals as claimed in claims one, two and three where the light that accomplishes the switching of the light signal in the channel is imposed upon a conductor near the light channel with the signal that is switched in it."

This claim teaches that the LIGHT TRIGGERED LIGHT SWITCH is actuated by the light signal passing near the light channel, no liquid metal, mercury, or gallium alloy is mentioned, as the piezoelectric material responds to the light signal actuating the switch. The WORKING-FLUID MOVING DEVICE, patent application 20040037708, uses the electrical conductivity of the mercury to switch as is pictured in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left of Murasato et. al., U.S.P. Application No. 20040037708, mercury is pushed around to make the switch function. The two switches function completely differently.

Appendix A

The following is a duscussion of the claims made in United States Patent Application number 20040037708 entitled the WORKING-FLUID MOVING DEVICE by Murasato, Masahiro; et al., the claims will be handled in order from first to last with out being numbered.

The first words of Claims in patent application 20040037708 which teaches WORKING-FLUID MOVING DEVICE read as follows:

"A working-fluid moving device comprising a first working fluid, a second working fluid, and a housing body including a channel and housing the first working fluid and the second working fluid in the channel;"

The channel mentioned here is not an optical channel but a channel (number 13) with two electrodes (numbered 11d) and mercury or gallium alloy (numbered 14) make the contact or are pushed so the metal is not making contact. In the disclosure, this is called the switch in the driven state. The first working fluid is divided by the action of its inferior wetting of the walls and the pinching of the channel getting smaller. The whole object of the WORKING-FLUID MOVING DEVICE is to pinch down the channel where the mercury or gallium alloy is separated so that electrical contact is lost between the electrodes or terminals, while the LIGHT TRIGGERED LIGHT SWITCH teaches how the electric field of the light can shut off the light passing through the switch.

The second words of Claims in the WORKING-FLUID MOVING DEVICE are as follows:

"wherein the housing body includes a deformable portion in which at least a portion of a wall of the channel is deformable so as to cause a change in a sectional shape of the channel,"

This channel is full of the two working fluids. The first one (numbered 14) of which is mercury or gallium alloy. This channel

is deformable so that the first working fluid (numbered 14) that is wetting the walls less that is electrically conductive can be divided into two. This will break the electrical path between the two electrodes or terminals (numbered 11d). The switch will be closed or open for electrical conductivity. In the disclosure of the LIGHT TRIGGERED LIGHT SWITCH one finds described the wall of the wave-guide closes in to shut off the light signal (Figure 1B, 2B, and 3B).

The next words of Claims in the WORKING-FLUID MOVING DEVICE are as follows:

"and houses the first working fluid and the second working fluid such that, when the deformable portion is in a first state, the first working fluid is substantially in contact with a portion of an inner wall surface of the channel, the portion corresponding to the deformable portion, and the second working fluid is substantially in contact with the remaining portion of the inner wall surface of the channel;"

The first working fluid (numbered 14) is the one that wets the wall of the channel less and is electrically conductive. This is seen in Figure 1. In this state, the electrodes connect electrically through the first working fluid, which is mercury, or a gallium alloy as is noted in Claim 7. Used in an optical switch mode the light would reflect off the center of the switch when the first working fluid (mercury or gallium alloy) was in the center of the switch and when pushed out the light would pass into the switch. The LIGHT TRIGGERED LIGHT SWITCH is composed of an optical channel that is closed down to too small a dimension for the light to pass through. The light passes through the large channel and does not

pass through the channel that is made too small. These switches function very differently.

The next words of the Claims in the WORKING-FLUID MOVING DEVICE are as follows:

"the first working fluid and the second working fluid are selected such that the first working fluid is inferior to the second working fluid in wettability to the inner wall surface of the channel;"

The wettability of the first and second working fluids is important because when the channel is closed down the first working fluid separates into two as is seen in Figure 2. This is called the driven state, which is pictured in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. This breaks the electrical connection between the two electrodes or terminals labeled 11d (Fig.1&2), 41a1 (Fig. 5), 53 and 54 (Fig.7), 62 and 63 (Fig. 8), and 72 (Fig.9), and puts the switch in the open condition. In the LIGHT TRIGGERED LIGHT SWITCH, wettablity is never mentioned. Mercury or gallium alloy are never mentioned. When the WORKING-FLUID MOVING DEVICE is being used to switch light signals one must guess the light is reflected by the liquid metal or the metal is moved out of the way so that no reflection occurs. The patent application for the WORKING-FLUID MOVING DEVICE does not describe how the switch could be used as a fiber optic switch. In the LIGHT TRIGGERED LIGHT SWITCH, light in or near to the wage-guide or light channel is of sufficient power to cause the piezoelectric material in the switch to change dimensions so that the light can no longer pass through the channel. That is as is claimed in Claims 1, 2, and 3 of the LIGHT TRIGGERED LIGHT SWITCH. Clearly, these switches described in patent application

20040037708 and those in application 10/732,857 function completely differently.

The next words of Claims in the WORKING-FLUID MOVING DEVICE are as follows:

"and when the deformable portion in the first state is deformed to assume a second state different from the first state, the first working fluid is moved by means of a repulsive force induced by the inferior wettability of the first working fluid to the inner wall surface of the channel."

It is the first working fluid of patent application 20040037708 that is in the center of the channel to reflect or is moved to the sides by its wettability being inferior so it will move to the ends of the channel and not reflect the light signal. This is not described in the patent application, but one can infer it from the descriptions of Optical Display Element uses of the WORKING-FLUID MOVING DEVICE described in paragraphs 0021 and 0127. In Application 10/732,857 Claims 3, 9, 10, 11,and 12, there is a portion of the wave-guide that is filled with a compressible fluid that is not compressed or is compressed depending on the light acting on the piezoelectric element in the switch pictured in Figure 3A and 3B. In the WORKING-FLUID MOVING DEVICE, the first working fluid is pressured by the walls of the channel (not a light channel) to separate into two, breaking the electrical connection provided by it between the electrodes or terminals numbered 11d, 41a1, 53, 54, 62, 63, or 72. The first working fluid being separated into two is also called the driven state in the descriptions of the drawings paragraphs 0033, 0034, 0036,0038, 0041, 0043, 0045, 0048, 0051, and 0054. The driving of the device is by an applied voltage. In

paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be what actuates the piezoelectric/electrostrictive film. Voltages can be switched on and off by a hand actuated switch, an electromagnetic solenoid, a relay, or a transistor circuit. The fastest of these would be the transistor circuit, which can switch at 10^{-9} seconds in the best conditions. This is one billionth of a second (10^{-9}), then the mercury of the first working fluid must move. A hundred millionth (10^{-8}) or a ten millionth (10^{-7}) of a second is the fastest that the WORKING-FLUID MOVING DEVICE can hope to switch. The LIGHT TRIGGERED LIGHT SWITCH is turned on or off by the electric field of light. The LIGHT TRIGGERED LIGHT SWITCH will switch faster than a hundred billionth of a second (10^{-11}) at the slowest. The LIGHT TRIGGERED LIGHT SWITCH can switch in a ten trillionth of a second (10^{-13}), if one chooses the proper wavelength to do the switching. Clearly, these switches function completely differently.

More WORKING-FLUID MOVING DEVICE Claims of Murasato et al., U.S.P. application No 20040037708 read as follows:

"A working-fluid moving device comprising a first working fluid, a second working fluid, and a housing body comprising at least a pair of opposed walls and housing the first working fluid and the second working fluid in a channel formed by the paired, opposed walls;"

This claim deals with a channel filled with a first and second working fluids. This channel is not an optical channel for according

to claim 7 one of the working fluids does not allow light to pass being mercury or gallium alloy which are opaque and reflective liquid metals. The three independent claims in patent application 11/732,857 all teach light in a channel or a light signal in a channel. These two patent applications cannot be the same if one has opaque materials in the channel it claims while the other has transparent channels for light to pass through and be switched in them.

Next words in the Claims of Murasato et al., U.S.P. application No 20040037708 read as follows:

"wherein the housing body includes a deformable portion in which at least a portion of the paired walls of the channel is deformable so as to cause a distance between the paired walls to change between a first distance and a second distance shorter than the first distance,"

The distance between the walls becomes smaller to cause the first working fluid which (numbered 14) has poorer wettability to divide into two breaking the electrical connection between the electrodes or terminals (numbered 11d (Fig.1&2), 41a1 (Fig. 5), 53 and 54 (Fig.7), 62 and 63 (Fig. 8), and 72 (Fig.9). The first working fluid is a liquid metal mercury or gallium alloy (Claim 7). The channel getting smaller does not cause the light signal to shut off as the action of the piezoelectric element in the LIGHT TIRGGERED LIGHT SWITCH does. The light channel becomes smaller in the LIGHT TRIGGERED LIGHT SWITCH by the action of the voltage of a light signal that is of sufficient power, while the channel with the mercury in it of the WORKING-FLUID MOVING DEVICE is made smaller by the application of a voltage. In paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the

words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be this voltage in the WORKING-FLUID MOVING DEVICE will be switched on or off by some means previously invented like a hand switch, a solenoid, a relay, or a transistor. The fastest of these is a transistor, which can at the fastest switch in a billionth of a second (10^{-9}), then the mercury of the first working fluid must move. A hundred millionth (10^{-8}) or a ten millionth (10^{-7}) of a second is the fastest that the WORKING-FLUID MOVING DEVICE can hope to switch. The LIGHT TRIGGERED LIGHT SWITCH is turned on or off by the electric field of light. The LIGHT TRIGGERED LIGHT SWITCH will switch faster than a hundred billionth of a second (10^{-11}) at the slowest. The LIGHT TRIGGERED LIGHT SWITCH can switch in a ten trillionth of a second (10^{-13}), if one chooses the proper wavelength to do the switching. The LIGHT TRIGGERED LIGHT SWITCH is clearly superior to the WORKING-FLUID MOVING DEVICE and should be granted patent protection.

Next words in Claims of Murasato et al., U.S.P. application No 20040037708 read as follows:

"and houses the first working fluid and the second working fluid such that, when the distance between the paired walls at the deformable portion assumes the first distance, the first working fluid is substantially in contact with portions of inner surfaces of the paired walls, the portions corresponding to the deformable portion, and the second working fluid is substantially in contact

with the remaining portions of the inner surfaces of the paired walls;"

This part of this claim is describing the first working fluid in the center position of the switch the on position for it is touching both electrodes or terminals and the switch will conduct electricity. The WORKING-FLUID MOVING DEVICE is actuated by the application of a voltage on a wire. The LIGHT TRIGGERED LIGHT SWITCH has no electrodes no mercury or gallium alloy. The LIGHT TRIGGERED LIGHT SWITCH does not conduct electricity at any time. The LIGHT TRIGGERED LIGHT utilizes the voltage of light and has no transistor turning on the voltage to a wire. The WORKING-FLUID MOVING DEVICE has no light channels or optical wave-guides. These are very different inventions.

Next words in Claims of Murasato et al., U.S.P. application No 20040037708 read as follows:

"the first working fluid and the second working fluid are selected such that the first working fluid is inferior to the second working fluid in wettability to the inner surfaces of the paired walls of the channel; and when the deformable portion is deformed such that the distance between the paired walls changes from the first distance to the second distance, the first working fluid is moved by means of a repulsive force induced by the inferior wettability of the first working fluid to the inner surfaces of the paired walls"

This part of this claim is describing the first working fluid separated to the ends of the channel of the switch the off position for not connecting the electrodes or terminals and the switch will not conduct electricity. The WORKING-FLUID MOVING DEVICE

is actuated by the application of a voltage on a wire. The LIGHT TRIGGERED LIGHT SWITCH has no electrodes no mercury or gallium alloy. The LIGHT TRIGGERED LIGHT SWITCH does not complete and interrupt an electrical circuit at any time. The LIGHT TRIGGERED LIGHT utilizes the voltage of light and does not depend on a transistor turning on the voltage to a wire. The WORKING-FLUID MOVING DEVICE has no light channels or optical wave-guides. These are very different inventions.

More WORKING-FLUID MOVING DEVICE Claims of Murasato et al., U.S.P. No 20040037708 read as follows:

"A working-fluid moving device according to claim 1 or 2, wherein the housing body is configured such that a plurality of deformable portions are formed on a single channel and such that, when each of the deformable portions is deformed, the first working fluid which is substantially in contact with the inner wall surface of the channel at the deformable portion is moved by means of the repulsive force."

This claim teaches that the switch could be made in such a configuration that plurality of electrical switches can be formed with the first working fluid contacting or not contacting the terminals. The mechanism that this claim describes is different from the mechanism described in the claims of The LIGHT TRIGGERED LIGHT SWITCH, which involve light of various wavelengths causing piezoelectric material to change dimensions. Claims 4, 5, 6 and 12, 13, and 14 for the LIGHT TRIGGERED LIGHT SWITCH are about light of various wavelengths influencing piezoelectric material to effect the switch action.

More WORKING-FLUID MOVING DEVICE Claims in Murasato et al., U.S.P. Application No 20040037708 read as follows:

"A working-fluid moving device according to any one of claims 1 to 3, wherein the first working fluid is an incompressible fluid, and the second working fluid is a compressible fluid."

The WORKING-FLUID MOVING DEVICE has a channel that is filled with the first and second working fluids. The first working fluid according to Claim 7 is mercury or gallium alloy. A channel full of mercury or gallium alloy is not an optical channel or an optical wave-guide. This switch does not have a channel that closes down by the action of the electric field of light on a piezoelectric element as the LIGHT TRIGGERED LIGHT SWITCH does. Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B of the WORKING-FLUID MOVING DEVICE show clearly that the signal being switched is an electrical one not a optical one. Figures 1A, 1B, 2A, 2B, 3A, and 3B show that the light signals in the LIGHT TRIGGERED LIGHT SWITCH travel along the light switch that is actuated by the movement of the piezoelectric element acted upon by the electric field of the light in the wave-guide. These switches operate on completely different principals.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 4, wherein the first working fluid is liquid, and the second working fluid is vapor of the first working fluid."

The WORKING-FLUID MOVING DEVICE has a channel that is filled with the first and second working fluids. The first working fluid according to Claim 7 is mercury or gallium alloy. A channel full of mercury or gallium alloy is not an optical channel or an optical wave-guide. This switch does not have a channel that closes down by the action of the electric field of light on a piezoelectric element as the LIGHT TRIGGERED LIGHT SWITCH does. Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B of the WORKING-FLUID MOVING DEVICE show clearly that the signal being switched is an electrical one not a optical one. Figures 1A, 1B, 2A, 2B, 3A, and 3B show that the light signals in the LIGHT TRIGGERED LIGHT SWITCH travel along the light switch that is actuated by the movement of the piezoelectric element acted upon by the electric field of the light in the wave-guide. These switches operate on completely different principals.

1. More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 5, wherein the first working fluid is a liquid metal."

This Claim shows clearly that the channel in the drawings of the WORKING-FLUID MOVING DEVICE is not an optical channel as the channels are in Patent Application 10/732,857, which teaches LIGHT TRIGGERED LIGHT SWITCH. A liquid metal will not

allow light signals to pass. This is very different mechanism than is described in Claims 1, 2, and 3 of the LIGHT TRIGGERED LIGHT SWITCH that teach that the physical dimensions of the light channel are opened up or closed off by the action of the electric field of the light on piezoelectric elements. The LIGHT TRIGGERED LIGHT SWITCH is very different from the WORKING-FLUID MOVING DEVICE and should be granted patent protection.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to claim 6, wherein the liquid metal is mercury or a gallium alloy. "

This claim makes clear that the action of the WORKING-FLUID MOVING DEVICE is manipulating a conductive liquid metal to switch electrical signals delivered to the electrode or terminals. This is not how the LIGHT TRIGGERED LIGHT SWITCH works. In Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"light channel that is made
A larger in cross section by opening to the passage of the light signals
B smaller in cross section by closing to the passage of the light signals"

In Claim 2 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"where the channel carrying the light is made
A.larger in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material
B.smaller in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material"

In Claim 3 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"A. Contract the piezoelectric wall of the channel to open up
C. Expanding into the light channel to close"

The two switches function differently. Patent application 20040037708 teaches the moving of mercury or gallium alloy, while Application 10/732,857 teaches the optical wave-guide is physically made large enough or pinched down to be too small to turn on or shut off the light.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 7, further comprising an actuator for generating a force which causes deformation of at least a portion of a wall of the deformable portion, wherein at least the portion of the wall to be deformed is a diaphragm."

Murasato et. al., U.S.P. Application No. 20040037708 speaks often of the first working fluid, which is moved to a position by the walls

of the channel. The first working fluid is a liquid metal or mercury or gallium alloy. The movement of the walls is accomplished by the voltage that is applied. The switching function of the WORKING-FLUID MOVING DEVICE is controlled by the voltage applied that moves the wall and moves the working fluid. This claim teaches that the moving wall can be a diaphragm. Once the first working fluid is divided, it no longer provides electrical continuity between the electrodes or terminals (11d) and the switch is in the off position. This is very different from what Application 10/732,857 describes as the function of the switch that it teaches. In Claim 1 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"light channel that is made
A.larger in cross section by opening to the passage of the light signals
B.smaller in cross section by closing to the passage of the light signals"

In Claim 2 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"where the channel carrying the light is made
A. larger in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material
B. smaller in cross section by the action of the electric field of the light in the channel on the piece of piezoelectric material"

In Claim 3 of the LIGHT TRIGGERED LIGHT SWITCH the words are as follows:

"A. Contract the piezoelectric wall of the channel to open up

B. Expanding into the light channel to close"

The two switches function differently. Patent application 20040037708 teaches the moving of working fluids that are mercury or gallium alloy, while Application 10/732,857 teaches the optical wave-guide is physically made large enough or pinched down to be too small to turn on or shut off the light.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 7, wherein deformable walls of the deformable portion comprise a pair of opposed diaphragms; and a pair of actuators are fixedly attached to the corresponding diaphragms."

In this claim, opposed diaphragms and actuators are noted. The purpose they serve is to push on the working fluids and separate them as Figures 1and 2, 3A and 3B, 4A and 4B, 5B and 5C, 6A and 6B, 7B and 7C, 8A and 8B, and 9A and 9B of the WORKING-FLUID MOVING DEVICE show. The working the first working fluid can be liquid mental (Claim 6) or mercury or gallium alloy (Claim 7). The channel that has these opposed diaphragms is not an optical channel as the channels are in Patent Application 10/732,857. The LIGHT TRIGGERED LIGHT SWITCH has not liquid metal or mercury. The LIGHT TRIGGERED LIGHT SWITCH has not electrodes or terminals. The actuators mentioned in Claim 9 would be supplied a the application of a voltage as is seen in paragraphs

0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the words "voltage being applied" are used. In paragraphs 0138, 0150, 0153 the words "application of voltage" are used. In paragraph 0156, the words "voltage must be applied" are used. The voltage would be what powers the actuators. The LIGHT TRIGGERED LIGHT SWITCH on the other hand uses the voltage in the power of light. In the disclosure of the LIGHT TRIGGERED LIGHT SWITCH the DETAILED DESCRIPTION OF THE INVENTION, the second sentence teaches that the electric field of the light acts upon the piezoelectric material to make the switch actuate. From that second sentence on through mathematical calculations with the Poynting vector equation, that is used to explain the way the electric field of the light in the channel actuates the piezoelectric material causing it to expand or contract, and on into the description of each drawing, the light power is triggering the switching. An applied voltage of the WORKING-FLUID MOVING DEVICE can be turned on by a hand switch, a solenoid, or a transistor. The fastest of these is the transistor at 10^{-9} seconds. The voltage of light used in the LIGHT TRIGGERED LIGHT SWITCH can switch in 10^{-13} seconds. The LIGHT TRIGGERED LIGHT SWITCH is clearly superior and should be granted patent protection.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to claim 8 or 9, wherein the actuator comprises a film-type piezoelectric element including a

piezoelectric/electrostrictive film or an antiferroelectric film."

The WORKING-FLUID MOVING DEVICE uses piezoelectric elements as does the LIGHT TRIGGERED LIGHT SWITCH, but the WORKING-FLUID MOVING DEVICE actuates the piezoelectric by applying a voltage while the LIGHT TRIGGERED LIGHT SWITCH use the electric field in a light signal.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE patent are as follows:

"A working-fluid moving device according to any one of claims 8 to 10, wherein the diaphragm is a ceramic diaphragm."

The diaphragm in this claim, which can be ceramic, bends in and divides the first working fluid form in the center of the channel to the ends of the channel. This is called the driven state, which is pictured in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. In this state, the switch does not provide an electrical path between the electrodes or terminals labeled 11d (Fig.1&2), 41a1 (Fig. 5), 53 and 54 (Fig.7), 62 and 63 (Fig. 8), and 72 (Fig.9), and puts the switch in the open condition. This switch is depicted as a switch for electrical signals on a wire. Figures 7D, 8C, 9C, 11B, 12B, and 13 represent the WORKING-FLUID MOVING DEVICE as an electrical switch. This patent application never refers to optical channels or light wave-guides. On the other hand, Patent
Application 10/732,857, which teaches the LIGHT TRIGGERED LIGHT SWITCH, is all about light signals in optical channels not

electrical signals on a wire. Nowhere in the application, 10/732,857 are wires depicted. These are two different inventions.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

" A working-fluid moving device according to any one of claims 1 to 11, wherein the deformable portion is formed from ceramic."

The deformable portion of the wall in this claim, which can be ceramic, bends in and divides the first working fluid form in the center of the channel to the ends of the channel. This is called the driven state, which is pictured in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. In this state, the switch does not provide an electrical path between the electrodes or terminals labeled 11d(Fig.1&2), 41a1 (Fig. 5), 53 and 54 (Fig.7), 62 and 63 (Fig. 8), and 72 (Fig.9), and puts the switch in the open condition. This switch is depicted as a switch for electrical signals on a wire. Figures 7D, 8C, 9C, 11B, 12B, and 13 represent the WORKING-FLUID MOVING DEVICE as an electrical switch. This patent application never refers to optical channels or light wave-guides.
On the other hand, Patent Application 10/732,857, which teaches the LIGHT TRIGGERED LIGHT SWITCH, is all about light signals in optical channel not electrical signals on a wire. Nowhere in the application, 10/732,857 are wires depicted. These are two different inventions.

WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 12, wherein the inner wall surface of the deformable portion is formed from ceramic."

The deformable portion of the wall in this claim which can be ceramic bends in and divides the first working fluid form in the center of the channel to the ends of the channel. This is called the driven state, which is pictured in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. In this state, the switch does not provide an electrical path between the electrodes or terminals labeled 11d(Fig.1&2), 41a1 (Fig. 5), 53 and 54 (Fig.7), 62 and 63 (Fig. 8), and 72 (Fig.9), and puts the switch in the open condition. This switch is depicted as a switch for electrical signals on a wire. Figures 7D, 8C, 9C, 11B, 12B, and 13 represent the WORKING-FLUID MOVING DEVICE as an electrical switch. This patent application never refers to optical channels or light wave-guides.
On the other hand, Patent Application 10/732,857, which teaches the LIGHT TRIGGERED LIGHT SWITCH, is all about light signals in optical channel not electrical signals on a wire. Nowhere in the application, 10/732,857 are wires depicted. These are two different inventions.

More FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 13, wherein the inner wall surface of the deformable portion is coated with a material whose wettability to the first working fluid is low."

The low wettability coating that this claim deals with highlights again the difference between Patent Application 20040037708 and Patent Application 10/732,857. The low wettability of the first working fluid is what makes it divide when the channel is made small by the walls moving in. This dividing is seen in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. The liquid metal, mercury or gallium alloy divides so it no longer provides a conductor between the electrodes or terminals. This channel is not an optical channel. Patent Application 10/732,857 deals with optical channels made to small for light signals in response to a light signal. Hence, it is called the LIGHT TRIGGERED LIGHT SWITCH. The driven state of the WORKING-FLUID MOVING DEVICE never mentions optical channels or optical wave-guides.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 13, wherein the inner wall surface of the deformable portion is modified so as to assume inferior wettability to the first working fluid."

The wall surface modified so as to assume low wettability coating that this claim deals with highlights again the difference between

Patent Application 20040037708 and Patent Application 10/732,857. The low wettability of the first working fluid is what makes it divide when the channel is made small by the walls moving in. This dividing is seen in Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. The liquid metal, mercury or gallium alloy divides so it no longer provides a conductor between the electrodes or terminals. This channel is not an optical channel. Patent Application 10/732,857 deals with optical channels made to small for light signals in response to a light signal. Hence, it is called the LIGHT TRIGGERED LIGHT SWITCH. The driven state of the WORKING-FLUID MOVING DEVICE never mentions optical channels or optical wave-guides.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 15, wherein the channel of the housing body is formed as a closed space, and the housing body comprises a volume change absorptive portion for absorbing a change in volume of the closed space associated with deformation of the deformable portion."

This claim is associated with a place for the working fluids to go when they are pushed around. Some adjustment in the volume of the working fluids may be made with the facility that this claim teaches. The working fluid dividing when the channel is made smaller is key to the function of Murasato et. al., U.S.P. Application No. 20040037708 as it is shone in the drawings Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. No dividing of fluid is mentioned in Patent Application 10/732,857 because the

liquids and gasses in the LIGHT TRIGGERED LIGHT SWITCH allow the passage of the light signals that are being switched and the light signals that are causing the switching. While at least one of the working fluids will not allow light to pass through the channel in the WORKING-FLUID MOOVING DEVICE being liquid metal, mercury, or gallium alloy. The channels of these devices have different functions. No mention of an optical channel or wave-guide is made in of Murasato et. al., U.S.P. Application No. 20040037708.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 16, wherein deformation of the deformable portion causes the first working fluid in a single mass to break into two or more fluid masses."

The working fluid dividing when the channel is made smaller is key to the function of Murasato et. al., U.S.P. Application No. 20040037708 as it is shone in the drawing Figures 2A, 2B, 3B, 4B, 5C, 6B, 8A right, 8B left, and 9A right, 9B left. No dividing of fluid is mentioned in Patent Application 10/732,857 because the liquids and gasses in the LIGHT TRIGGERED LIGHT SWITCH allow the passage of the light signals that are being switched and the light signals that are causing the switching. While at least one of the working fluids will not allow light to pass through the channel in the WORKING-FLUID MOOVING DEVICE being liquid metal, mercury, or gallium alloy. The channels of these devices have different functions. No mention of an optical channel or wave-

guide is made in of Murasato et. al., U.S.P. Application No. 20040037708.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"A working-fluid moving device according to any one of claims 1 to 17, wherein the first working fluid is an electrically conductive fluid; the second working fluid is an electrically insulative fluid; and at least a pair of terminals are formed such that, before the deformable portion is deformed, the terminals assume one of an electrically connected state, in which the terminals are electrically connected via the first working fluid,"

The two states that the WORKING-FLUID MOVING DEVICE can be in are described in this claim. These first words focus on the electrically connected state. This switch is depicted as a switch in an electrical circuit in Figures 7D, 8C, 9C, 11B, 12B, and 13. Never is the LIGHT TRIGGERED LIGHT SWITCH depicted as an electrical circuit. It is a fiber optic channel light signal device. It is actuated by light and can switch 10,000 times faster than the WORKING-FLUID MOVING DEVICE. The LIGHT TRIGGERED LIGHT SWITCH is different from and better than the WORKING-FLUID MOVING DEVICE. The LIGHT TRIGGERED LIGHT SWITCH should be granted patent protection.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are as follows:

"and an electrically disconnected state and such that, after the deformable portion is deformed to cause movement of the first working fluid, the terminals assume the other of the electrically disconnected state and the electrically connected state."

The two states that the WORKING-FLUID MOVING DEVICE can be in are described in this claim. These last words focus on the electrically disconnected state. This switch is depicted as a switch in an electrical circuit in Figures 7D, 8C, 9C, 11B, 12B, and 13. This disconnected state is caused by a voltage that is applied that causes the channel to be smaller. This applied voltage is mentioned in the patent. In paragraphs 0072,0073, 0086, 0087,0094, 0095, 0136, 0148, 0150, 0156, 0164, 0166, the words "voltage is applied" are used. In paragraphs 0092, 0131 the paragraph 0156, the words "voltage must be applied" are used. The LIGHT TRIGGERED LIGHT SWITCH on the other hand uses the voltage in the power of light. In the disclosure of the LIGHT TRIGGERED LIGHT SWITCH the DETAILED DESCRIPTION OF THE INVENTION, the second sentence teaches that the electric field of the light acts upon the piezoelectric material to make the switch actuate. From that second sentence on through mathematical calculations with the Poynting vector equation, that is used to explain the way the electric field of the light in the channel actuates the piezoelectric material causing it to expand or contract, and on into the description of each drawing, the light power is triggering the switching. An applied voltage of the WORKING-FLUID MOVING DEVICE can be turned on by a hand switch, a solenoid, or a transistor. The fastest of these is the transistor at 10^{-9} seconds. The voltage of light used in the LIGHT TRIGGERED LIGHT SWITCH can switch in 10^{-13} seconds. The LIGHT TRIGGERED LIGHT SWITCH is different from and better

than the WORKING-FLUID MOVING DEVICE. The LIGHT TRIGGERED LIGHT SWITCH should be granted patent protection.

More WORKING-FLUID MOVING DEVICE Claims in the WORKING-FLUID MOVING DEVICE
patent are similar to the words that follows:

A working-fluid moving device according to the claim being discussed, wherein a plurality of terminal connection-state changeover elements are formed on a single channel, each terminal connection-state changeover element comprising the deformable portion and the paired terminals.

Nowhere in Murasato et. al., U.S.P. Application No. 20040037708 is a optical channel, optical wave-guide or even a fiber optic mentioned. The switch is only associated with optical signals in four places. That is in paragraphs 0002, 0021, 0127,and 0195. In paragraph 0002, a use is suggested for the WORKING-FLUID MOVING DEVICE of a switch for optical paths, but nowhere in the patent application is it explained how the switch would function. In paragraph, 0021 and 00127 an optical display element is a possible use of the WORKING-FLUID MOVING DEVICE. This function does not turn on and off optical signals in a channel as the LIGHT TRIGGERED LIGHT SWITCH does. In paragraph, 0195 suggests an optical position detector as a use for the WORKING-FLUID MOVING DEVICE. Again, this is not an on and off switch for optical signals in a fiber optic channel or wave-guide as the LIGHT TRIGGERED LIGHT SWITCH is. In Figures 7D, 8C, 9C, 11B, 12B, and 13 the WORKING-FLUID MOVING DEVICE drawing as a switch for electricity in a wire. These are very different inventions.

Conclusion:

Please consider the arguments presented here. Please let my claims be allowed.

Thank you for your time and effort.